A DISSERTATION ON

A STUDY OF 100 CASES

OF

GROIN HERNIA REPAIR

M.S. Degree (Branch I)

GENERAL SURGERY

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CERTIFICATE

This is to certify that this dissertation entitled "**A STUDY OF 100 CASES OF GROIN HERNIA REPAIR**" submitted by DR.R. SIVA PRIYA to the faculty of General Surgery, The Tamil Nadu Dr. M.G.R. Medical University, Chennai, in partial fulfilment of the requirement in the award of degree of M.S.Degree, Branch – I (GeneralSurgery), for the SEPTEMBER 2006 examination is a bonafide research work carried out by her under our direct supervision and guidance.

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CONTENTS

INTRODUCTION

"No disease of the human body, belonging to the province of the surgeon requires in its treatment a better combination of an anatomical knowledge with surgical skill than Hernia in all its varieties."

- Sir Astley Paston Cooper, 1804.

Hernia is derived from the latin word - Rupture

A hernia is defined as a abnormal protrusion of an organ or tissue through a defect in surrounding walls.

Among the abdominal wall hernias, groin hernia which includes inguinal and femoral hernia are the commonest which occurs due to the defect in the inguinal and femoral canal region.

My study focuses on the Groin hernias it occurrence, age distribution, Sex distribution, associated conditions, type of management for groin hernia, its complication like recurrences and prevention of it.

AIM OF THE STUDY

- To study the Age distribution in Groin hernias
- To study the prevalence of Direct, Indirect & Femoral hernias most common side of occurrence.
- To study the predisposing factors like benign prostatic hypertrophy, chronic bronchitis, obesity, strenuous labourers, previous surgery
- To study the different types of repair done
- To study the post operative complications of groin hernia repair
- To study the recurrent hernia operated
- To prevent development of recurrent hernias.

HISTORY

The earliest record of Inguinal Hernia dates back to approximately 1500 BC.

Greek word Hernia - offshoot, a budding, or bulge.

Latin word hernia - rupture or tear.

Trusses and bandages generally were used to control the herniation.

In the earlier part of the first century AD, Celsus described the operation in vogue at that time in the Greco-Roman area.

Through an incision in the neck of the scrotum, the hernial sac was dissected off the spermatic cord and transected at the external inguinal ring.

The testis usually was excised as well. The incision was generally left open. Later, a mass ligature of the sac and cord at the external ring was recommended with excision of the sac, cord, and testis distal to the ligature, as described by Paul of Aegina in 700 AD.

Guy de chauliac, in 1363. differentiated between inguinal and femoral hernia and described the technique of reduction for strangulation.

In 1556, Frenco illustrated the use of a grooved director to cut the strangulating neck of the hernia while avoiding the bowel."

In 1559, Casper Stromayr, distinguished direct from indirect hernia and advised that the testicle need not be removed during an operation for the former.

From beginning of the 18th to early 19th century the anatomy of the inguinal region was described

The dawn of modern surgery began in 1865 when Joseph Lister introduced his method of antisepsis by carbolic spray.

By the beginning of the 20th century, Koch had developed methods of asepsis, which was followed by modern dry and wet heat sterilization.

REVIEW OF LITERATURE

TISSUE REPAIRS

Marcy, an American surgeon and a pupil of Lister, was the first to introduce antiseptic techniques in the repair of hernia. He was also the first to recognize the importance of the tranversalis fascia and of closing the internal ring.

In 1871, he published his report of two patients operated on in the previous year in whom he used carbolized catgut to suture the ring.

A French pupil of Lister, Lucas-Championniere, brought antisepsis to France.

In 1881 he reported that the first case in which the aponeurosis of the external oblique muscle was slit to reveal the canal, which allowed dissection and ligation of the sac at the internal ring under direct vision. The depressing fact at this time was that the best surgical centers in both Europe and North America were reporting mortality rates of up to7%for hernia operations. The recurrence rate after 1 year was 30% to 40% and almost all hernias had recurred by the end of 4 years.

The greatest contribution to hernia surgery was that of the Italian surgeon Edorado Bassini. His clear in sight into the anatomy and physiology of the inguinal region enabled him to dissect and reconstruct the inguinal canal to preserve the functional anatomy.

He laid the inguinal canal open widely by splitting the aponeurosis of the external oblique. He next opened the transversalis fascia from the pubic tubercle to beyond the internal ring. In this way he was able to dissect and ligate the sac high in

the retroperitoneal space. He realized the importance of repairing the transversalis fascia and of reinforcing the posterior wall of the canal: using interrupted sutures of silk, he sutured the internal oblique and transversus abdominis muscles, as well as the upper leaf of the transversalis fascia in one lower to the lower leaf of the transversalis fascia and with inguinal ligament. The rectus sheath was incorporated into the medial end of the repair. The aponeurosis of the external oblique muscle was resutured in front of the spermatic cord.

Bassini first performed this operation in 1884 and reported it in 1887, 1888, 1889,1890, and finally, in 1894,

206 operations with no operative mortality. The patients varied from young children to elderly men. Includes Bilateral repairs, strangulation, cryptorchidism, 5 years 100% followup, 11 wound infections and 8 recurrences.

These phenomenal results earned him the title of “Father of Modern Herniorrhaphy.”

During the next 100 years, most inguinal hernias were repaired by the Bassini method or variations of it. Some of the variations were unsuccessful Some were improvements and reduced the incidence of recurrent hernia.

In 1953, multilayered repair described by Shouldice. The “pure tissue” methods of study only local tissues with out addition of any prosthetic material. The recurrence rate is <1%.

Berliner and Lichtenstein - successful methods.

In 1898, George Lotheissen first reported the technique of suturing the musculoaponeurotic arch (conjoint tendon) to the pectineal (Cooper's) ligament.

Conjoint Tendon to the inguinal (Poupart's) ligament popularized by Bassini. The Lotheissen method had the added advantage of repairing the femoral ring as well as the inguinal defects especially recommended for a strangulated femoral hernia.

In 1940 U.S. McVay who showed, by anatomical dissections, that the transverses abdominis muscle and its fascia are normally inserted onto the pectineal ligament.

Rutledge - 1988 - suturing Fascia transversalis and Inguinal ligament

1993 - Published

Cooper ligament repair – most valuable when repairing a recurrent Inguinal Hernia when Inguinal ligament is destroyed.

Recurrence - Due to ignorance of functional anatomy and physiology of the abdominal wall leads to incomplete dissection &

1. to repair under tension
2. Wrong suture materials
3. Infection

Good musculo aponeurotic arch nearer the Inguinal

Ligament. - approximation Good

Weak musculoaponeurotic arch which is high and has a high gap between it and inguinal ligament. The sutures made under tension and so ‘relaxing incision’ or slides used to lessen the tension.

Darn Repairs

To avoid cut through of flesh muscular arch the ideal tensionless or tension free repair used.

Marcy type repair - To repair weakened or torn posterior wall

1. Of the Inguinal canal and the transversalis fascia
2. To tighten the stretched internal Inguinal ring and the cord.

Reinforcing posterior wall by either natural tissue like

a) External oblique aponeurosis by McArthur

b) Facial grafts from thigh by kirshner

c) Fascia lata strips by Gallie and LeMesurier

d) Skin cutt off edges of the incision and denuded of dermis by mair.

living tissue - Difficult to harvest tend to absorb.

Recurrence rate high.

In search for a suitable substitute

1937, Ogilvie - Silk lattice repair

1940, Maingot - floss silk for his darn

Mcleod - Used silk for the posterior

Silk - Biologic substance (Non absorbable) lost most of its strength with in a few minutes. Infection more - sinuses

Nichols, Diack & Aries - Uses Nylon

Medick - braided multifilament nylon for repair.

1945, Haxton – Monofilament nylon.

Patch Graft Repairs

Using a) Sheet of natural tissues

1) Flaps of fascia from thigh

2) Flaps of external & internal oblique muscle with anterior rectus sheath turned down

b) Biologic

c) Metals

d) Synthetic sheets or

Silver wire filigree sheets (Witzel & Goepal in Germany Barlett in U.S. MC Gavin in Britain.

Tantalun metal sheets - Burke 1940

Tantalum gauge - Throckmortor 1948

Sheets of woven or knitted mesh of polyamide and the newer polypropylene monofilament used as inlay or onlay graft cheap.

Universelly available

easily cut to required shape flexible

Pleasant to handle

Practically indestructible in human tissues

monofilament – smooth inert

Little tissue reaction

Not rejected even in presence of Infection

Collagen tissue can be laid down through the interstices of the weave so that the material is incorporated into health new tissue.

To create strong & tensionless repair

To suture either superficial or deep to the Transversalis fascia

Europe – Woven or knitted synthetic (French surgeons) polyester threads

Harrison - tried polymer gives – tried in animals but disappointing

PTFE

Polytetra flouro ethylene (PTFE)

Modern Herniologists

Lichenstein & Gilbert laid a swatch of synthetic mesh without sutures.

Preperitoneal Repairs

A History of inguinal hernia repair would be incomplete without a mention of the abdominal or preperitoneal approach.

This approach was recorded by the ancient Hindus for cases of strangulated hernia.

It was described in Europe in the Middle Ages and in the 16th century and was recommended toward the end of the 19th century.

All these procedures were performed transperitoneally.

Even as late as 1919, LaRoque described a gridiron transperitoneal incision for hernia repair.

The modern era of transabdominal, but extraperitoneal, repair of hernia was introduced by Cheatle in 1920. He first used a midline incision, but later changed to a low transverse or Pfannenstiel incision. He peeled the peritoneum off the abdominal wall and bladder and was able to transect the sac and repair the internal ring from above.

In 1960 Nyhus

1968 Read used of prosthetic material,

The foremost proponent today of the perperitoneal approach is Stoppa,

Incase of repeated recurrent hernias in case where tissues become scared & weakned and where normal anatomy destroyed.

Great prosthesis for reinforcement of the visceral Sac (GPRVS) in which, through a midline abdominal incision, a large sheet of prosthetic mesh in placed between the peritoneum & abdominal wall to close of all the hernial openings.

The surgeon today can choose between 4 basic techniques for hernia repair as classified by Culbert in 1987.

a) Pure tissue repair

b) Combined tissue & prosthetic repair

c) Pure prosthetic repair

d) Nylon darn

Recurrence rate < 1 %

Laparoscopic Repair for Inguinal Hernia :

The tidal wave of minimal access surgery has inevitably swept hernia repair along in its surge.

Laparoscopic transperitoneal closure of the internal orifice of groin hernias by a series of metal clips was introduced by Ger in 1977.

Since then several methods have evolved, but routine clinical application of the technique began only in 1990.

The most popular method today is the introduction of the laparoscope and instruments through several ports in the abdominal wall after induction of pneumoperitoneum under general anesthesia.

In the pediatric age group laparoscopic repair of inguinal hernia has been reported by Easter.

The advantages of laparoscopic herniorrhaphy are that, in experienced hands,

Quick

atraumatic,

bilateral repairs can be done at the same operation,

Short stay at hospital

Clinically unsuspected contra lateral hernias can be identified and repaired,

No orchitis,

No epididymitis,

No wound infection and neuralgia, Only small openings are made in the abdominal wall

So postoperative recovery and return to normal activities is rapid and practically painless.

The disadvantages include

Need for a general anesthetic

Violation of the abdominal cavity, with the future risk of adhesions

New hernias at the port sites

Complications of laparoscoic small and large bowel perforation, bladder laceration, adhesions, bowel obstruction, mesh erosion into the bladder, transient testicular pain, palpable mesh, mesh migration into the scortum, scrotal hydrocele, and pelvic osteitis.

Cost effective

ANATOMY OF THE INGUINAL REGION

Inguinal Canal :

The inguinal canal is an oblique intermuscular slit about 4 cm (over 2 inches) long lying above the medial half of the inguinal ligament. It commences at the deep inguinal ring, ends at the superficial inguinal ring, and transmits the spermatic cord and illoinguinal nerve in the male and the round ligament of the uterus and illioinguinal nerve in the female.

Its anterior wall is formed by the external oblique aponeurosis assisted laterally by a portion of the internal oblique muscle. Its floor is the inrolled lower edge of the inguinal ligament, reinforced medially by the lacunar ligament and fusing more laterally with the transversalis fascia. Its roof is formed by the lower edges of the internal oblique and transverses muscles, which arch over from in fronto of the cord laterally to behind the cord medially, where their conjoined aponeuroses, constituting the conjoint tendon, are inserted into the pubic crest and the pectineal line of the pubic bone. The posterior wall of the canal is formed by the weak transversalis fascia laterally.

Anterior wall and superficial Inguinal Ring :

The fibres of the external oblique aponeurosis run parallel with their lower border forms the Inguinal ligament. Above its medial end they diverge from each other to make a V- shaped opening, the superficial inguinal ring. The lateral crus of this opening is attached to the pubic tubercle, the medial crus to the pubic crest near

the symphysis. The intervening oblique aponeurosis and forms the base of the 'ring' which is triangular, not circular.

The anterior wall of the inguinal canal is reinforced laterally by the lowest muscle fibres of the internal oblique. The deep inguinal ring lies 1.25 cm (1/2 inch) above the midinguinal point ; the internal oblique fibres extend medial to this, for they arise from the lateral two – thirds of the ligament.

Floor :

The lacunar ligament filling the angle between inguinal ligament and pectineal line, passes upwards from the ligament to the bone. Its abdominal surface faces forwards as well as upwards. Its femoral surface faces backwards as well as down wards. It lies in the floor of the inguinal canal. Lateral to its attachment the incurved edge of the inguinal ligament forms a gutter which floors in the inguinal canal. The transversalis fascia is fused with this part of the inguinal ligament.

Roof :

This is formed by the arched lower borders of the internal oblique and transverses abdominis muscles. Each arises from the hollow of the inrolled lower edge of the inguinal ligament. The internal oblique muscle arises by fleshy fibres from the lateral two-thirds of the inguinal ligament. The fibres arch medially and down wards, merging into a flat aponeurosis. The most lateral fibres, those arising from just below the anterior superior iliac spine arch downwards to reach the pubic symphysis, in front of rectus abdominis.

The remaining fibres arch concentrically within the former, passing in front of rectus abdominis along the pubic crest as far as the pubic tubercle and then extending laterally along the pectineal line as far as the crescentric edge of the lacunar ligament. These lateral fibres, joining the underlying transverses aponeurosis, constitute with them the conjoint tendon.

The transverses abdominis lies more laterally at its origin, coming from only the lateral half of the internal oblique. They rapidly become tendinous and, fusing with the aponeurosis of the internal oblique, form the conjoint tendon which is attached along the pubic crest and extends laterally along the pectineal line. The conjoint tendon and the lacunar and the lacunar ligament, attached in common to the pectineal line, lie in planes at right angles to each other. The deep inguinal ring lies in the angle between the edge of transverses and the inguinal ligament. Since the internal oblique muscle arises a little more medially than this, it lies in front of the deep ring. The muscular arch of the roof, starting in the anterior wall of the canal, passes over the cord and , becoming tendinous, passes down behind the cord, in the posterior wall of the canal, to reach the pectineal line.

The lower most fibres of internal oblique and transverses are supplied by the iliohypogastric and illioinguinal nerves. Their contraction tightens the conjoint tendon and lowers the roof of the canal, like pulling down a shutter. Thus division of the ilioinguinal nerve above this level (as in a split-muscle incision for appendicectomy) lead to a direct inguinal hernia – the conjoint tendon bulges when intra abdominal pressure rises. Damage to the ilioinguinal nerve as it lies in the

inguinal canal does not paralyse these fibres; at this level the nerve is purely sensory, having already given off it motor fibres, and injury here will only cause some sensory loss over the anterior part of the scrotum (labium majus) and adjacent thigh.

Inguinal Ligament :

The inguinal Ligament (of Poupart) extends from the anterior superior iliac spine to the pubic tubercle. Its edge is rolled inwards to form a gutter; the lateral part of this gutter gives origin to part of the internal oblique and transverses abdominis muscles. The inguinal ligament is attached to the fascia lata of the thigh. When the thigh is extended the fascia lata pulls the inguinal ligament downwards into a gentle convexity.

Just above and lateral to the pubic tubercle is an oblique V shaped gap, the superficial inguinal ring, in the aponeurosis. This gap extends down to the pubic crest, medial to the tubercle : the aponeurosis is attached to the pubic crest only in its medial part, along side the pubic symphysis. From the medial end of the inguinal ligament the lacunar ligament (of Gimbernat) extends backwards to the pectineal line. Its crescentric free edge is the medial margin of the femoral ring. From the pubic tubercle, fibres may be traced upwards and medially behind the spermatic cord, to interdigitate in the linea alba with those of the opposite side. This is called the reflected part of the ligament.

Lastly, near the apex of the superficial inguinal ring are fibres running at right angles to those of the aponeurosis, the intercrural fibres that blend and prevent the crura from separating.

Spermatic Cord :

The spermatic cord, components may be considered under two headings : the three coverings of the cord, and its six (groups of) constituents.

Of the three coverings, the internal spermatic fascia is the investment derived from the transversalis fascia at the deep inguinal ring. As the cord passes through the ring into the inguinal canal, it picks up a second covering, the cremsteric fascia and cremaster muscle, from the internal oblique and transverses aponeuroses and muscles.

The transverses muscle fibres spiral down the cord and return behind it to become attached to the pubic tubercle. The internal oblique fibres, a larger contribution, also spiral around the cord and some return to the pubic tubercle. The internal oblique fibres, a larger contribution, also spiral around the cord and some return to the pubic tubercle but most return to the internal oblique itself. The third covering is from the crura of the superficial ring (external oblique aponeurosis), the external spermatic fascia.

The constituents of the Cord :

1. The ductus deferens, which usually lies in the lower and posterior part of the cord.
2. Arteries the largest of which is, with the testicular artery, and artery to the ductus, the cremasteric artery (from the inferior epigastric)
3. Veins – the pampiniform plexus
4. Lymphatics, essentially those accompanying the veins from the testis to para – aortic nodes, but including some from the covering which drain to external iliac nodes.
5. Nerves, in particular the genital branch of the genitofemoral nerve which runs among the coverings to supply the cremaster muscle, and is classified as part of the spermatic cord and not as a separate structure running through the inguinal canal. Other nerves are sympathetic twings which accompany the arteries.
6. The processus vaginalis, the obliterated remains of the peritoneal connection with the tunica vaginalis of the testis (and the constituent of the cord most commonly forgotten. When patent it forms the sac of an indirect inguinal hernia.

ETIO - PATHOGENESIS OF INGUINAL HERNIAS

Incidence

The incidence of inguinal hernias in adults varies between 15% and 20%. The male to female ratio is 12:1. The incidence varies between 5% and 8% in patients 25 to 40 years of age.

90% of inguinal hernia are on males. In adult males, 65% of inguinal hernias are indirect and 55% are right sided. Bilateral hernias are four times more commonly direct than indirect. Many hernias exist in the community undiagnosed, undetected ad unreported.

Mechanisms which prevent hernia in inguinal region :

Though inguinal region is a weak spot in the abdominal musculature, rise in intra abdominal pressure would have caused inguinal hernia in every individual. So there must be some defensive mechanisms which prevent hernia to occur. These are :

1. Obliquity of inguinal canal :

   When there is rise in intra-abdominal pressure, wall is opposed to the anterior wall and thus prevents coming out of abdominal content through inguinal canal.

2. Shutter mechanism of the arched fibres of internal oblique and transversus abdominis will bring down these muscles towards the floor when they are contracted during rise of intra-abdominal pressure.

3. Ball-valve action of the cremaster muscle which pulls up the spermatic cord into the canal and plug it during rise of intra-abdominal pressure.
4. In front of the deep inguinal ring there are strong fibres of the internal oblique. This prevents entry of any abdominal content through the deep inguinal ring.
5. Strong conjoined tendon is in front of Hesselbach's triangle to prevent direct inguinal hernia.

Indirect Inguinal Hernia :

An indirect inguinal hernia is not simply a congenital defect represented by a persistent patent processus vaginalis. A processus vaginalis can remain patent throughout life without the development of a hernia. A proportion of patent processus vaginalis apparently obliterate while others persist.

In males beyond adolescence, simple removal of an indirect hernial sac results in an unacceptable high recurrence rate indicating that other factors are involved in the pathogenesis. Moreover, the high frequency of indirect hernias in middle aged and older people suggests a pathological change in the connective tissue of the posterior inguinal wall. Thus the susceptibility to indirect inguinal hernia is based both on the presence of a congenital sac and on failure of the transversalis fascia.

Direct Inguinal Hernia :

The cause of an inguinal hernia is undoubtedly multi factorial.

Pathogenesis of direct inguinal hernia is more complex. In the majority of patients there is no peritoneal sac and the occurrence parallels ageing and other factors such as smoking. Thus the incidence would appear to be more directly related to a failure of the posterior inguinal wall or transversalis fascia. Additional factors include anatomical abnormalities such as a deficient medial half of the transversalis fascia and failure of the insertion of the internal oblique aponeurosis onto the superior pubic ramus.

1. Metabolic abnormalities have been identified including a generalized deficiency in collagen particularly in smokers and patients with abdominal aortic aneurysms.
2. A high incidence of hernia in Eskimos in the west Arctic of Greenland, where there is a high frequency of the HLA-B27 allele resulting in instability of mesenchymal tissues, points to a more specific genetic and collagen metabolic abnormality.

DIAGNOSIS AND CLASSIFICAITON OF INGUINAL HERNIA :

A hernia is suspected if there is an expansile impulse on coughing at the site of the normal hernial orificies. A cough may push the abdominal contents into the scrotum. If a swelling is visible the sign of reducibility helps to confirm the diagnosis. If there is no obvious swelling, digital palpation of the hernial orifice with the little finger helps to confirm the diagnosis.

A swelling in the inguinoscrotal region is likely to be an inguinal hernia. Inguinal hernia can be incomplete when it is termed bubonocele. A bubonocele is localized to the inguinal canal and does not pass beyond the level of the external abdominal ring. A complete hernia descends into the scrotum.

An indirect (oblique) hernia passes through the deep inguinal ring lateral to the inferior epigastric artery and descends through the inguinal canal. A direct hernia passes through the Hesselbach's triangle medial to the inferior epigastric artery. A direct inguinal hernia can be differentiated from an indirect hernia mainly by the finger invagination test and the deep ring occlusion test.

Indirect Inguinal Hernia :

Indirect inguinal hernia can occur at any age. There may be dragging pain in the groin. The patient presents with a swelling which is obliquely placed and pyriform in shape. The hernia often descends into the scrotum and reduces obliquely upwards, outwards and backwards. With the finger invagination test, the contents of the hernia strike the side of the tip of the finger. If a finger occludes the internal ring, the patient be asked to cough, an oblique hernia fails to appear but a

direct hernia bulges at once. Indirect hernia is usually unilateral, whereas direct hernia is often bilateral.

Direct Inguinal Hernia :

Direct Inguinal hernia usually occurs after 40 years of age. It may be bilateral. There may be invariably a history of chronic cough or straining at micturition or defaecation. A direct hernia is painless. The swelling is localized to the inguinal canal. It is large, globular and disappears when patient lies down. With the finger invagination test, the hernia strikes the pulp of the finger. After reduction on occlusion of the internal ring the hernia appears at once. If during the finger invagination test the finger passes directly backwards into the abdomen instead of obliquely upwards and outwards, the diagnosis is in favour of a direct hernia. In addition, if the edge of the external oblique is felt superiorly and pubic bone inferiorly, the point is confirmatory. With the impingement test, if the impulse impinges on the pulp of the finger the hernia is direct. On the other hand if the impulse hits the tip of the finger it is in favour of an indirect hernia.

HERNIOGRAPHY :

Herniography is a useful adjunct particularly in patients with obscure groin pain with a normal or inconclusive physical examination (Gullmo 1989). Complication rates are low and the false-positive rate is negligible. This approach should be considered mandatory in the professional sportsman with chronic groin pain before hernioplasty is considered because of the long list of differential diagnosis.

Radio opaque non ionic contrast material is injected intra peritoneally and the patient is maneuvered through various position in an attempt to introduce the material into an actual or potential hernias sac, that can be demonstrated radiographically in prone and semi prone positions.

There is no real indication for herniography in children and infants.

Hernio graphy may reveal a contralateral patent processus vaginalis in a child with an inguinal hernia.

Differential diagnosis of Groin Hernias

Primary testicular

- Varicocoele
- Epidydymitis
- Testicular torsion
- Hydrocoele
- Ectopic testicle
- Undescended testicle

Femoral artery aneurysm

- Lymphnode
- Sebaceous cyst
- Hidradenitis
- Cyst of canal of nuck
- Psoas abcess
- Hematoma of abdominal wall
- ascites
- Saphena varix

Malignancy - Lymphoma

Retroperitoneal sarcoma

Metastasis

Testicular tumour

Nyhus Classification System

I - Indirect hernia — Internal Ring — Infants children
Normal — small adults

II - Indirect — Enlarged without impingement on the floor of inguinal canal ; does not extend to the scrotum

III - A - Direct
B - Indirect Scrotal Hernia also includes pantaloon Hernia
C - Femoral hernias

IV — Recurrent — A - D
A - Indirect
B - Direct
C - Femoral
D - Mixed

Gilbert Classification :

I - Small, Indirect
II - Medium, Indirect
III - Large, Indirect
IV - Entire floor, Direct
V - Diverticular direct
VI - Combined
VIII - Femoral

FEMORAL HERNIA

There are several weakness & potential canals in the area between inguinal ligament and the superior pubic ramus through which hernias may occur. The most common hernia in this region is the femoral hernia.

Etiology of Femoral Hernia :

Femoral hernia is rare in infancy & childhood. So the etiology is probably not congenital. There is no evidence of preformed sac. Chapman reported a series of 1134 cases of groin hernias in childhood of which only 6 were femoral hernias, an incidence of 0.5%. The hernia usually appears after middle age, suggesting natural weakening of the tissues and loss elasticity is the basic cause. More common in multiparous women.

Anatomy of Femoral Canal :

The transversalis fascia emerges above from behind the musculo aponeuotic arch of internal oblique and the transversus abdominis muscle and passes down to attach to the pectineal ridge. In this way it closes off the area between the Inguinal ligament and the superior pubic ramus and separates abdomen from the thigh.

The area is mainly filled by the iliopsoas and pectineus muscles and the femoral artery and vein & nerve passes from abdomen to the thigh.

At its most medial end, a potential canal, the femoral canal through which the common type of femoral hernia emerges.

Boundaries :

Anteriorly	-	Inguinal ligament
Antero medially	-	Lacunar part of the Inguinal ligament (Gimbernat
Posteriorly	-	Pectineal ligament of the pubic ramus
Medially	-	Femoral vein & its sheath

Canal filled with loose areolar tissue & femoral lymph nodes with weakening and giving way of the transversalis fascia closing the canal, the peritoneal sac of the femoral hernia transverses the narrow rigid canal & passes into the loose subcutaneous area of the thigh. Here it is able to expand and pass forward to bulge below the inguinal ligament.

It may even pass upwards to cross the Inguinal ligament. The sac is covered with extra peritoneal fat and contains either small bowel, omentum or both. The sac is relatively large compared to the narrow neck, which has no room to expand so that strangulation is common.

Clinical manifestations :

1. Small reducible lump in the medial aspect of the groin
2. Lump is often permanent because of incarceration of the hernia
3. Commonly, especially in elderly females, the patient is unaware of the swelling and the first indication of its existence appears with the strangulation of the hernia going for Intestinal obstruction.

Chamaeus also stresses the high morbidity and mortality associated with emergency surgery and Intestinal obstruction in femoral Hernia.

Treatment of femoral hernias :

All femoral hernias with few exceptions should be operated on &repaired as soon as possible after diagnosis.

Even the elderly & sick can withstand a simple repair done under LA.

The frequency and high morbidity and mortality rate of strangulated femoral hernia, especially in the old and trail is a mandatory indication to operate on these patients electively, despite their brittle condition. An attempt should always be made decreased strangulated hernia.

An irrreducible strangulated femoral hernia is an urgent emergency.

Ivfluids, ryles tube, catheterization, To correct fluid and electrolyte Imbalance and any medical condition may be present.

Operation :

Incision : Small transverse thigh incision below the Inguinal ligament centered over the femoral canal. In strangulated hernia, the incision is placed over the swelling. The subcutaneous fat is split to reveal the mass of extra peritoneal got enveloping the sac.

This mass is freed by blunt dissection with finger & is dislocated forward. The inguinal ligament, pectineal fascia & the neck of the hernia exposed by gentle dissection

The exposure is practically bloodless. The mass of extra peritoneal fat is split to reveal the sac which is dissected to & beyond its narrow neck, then opened to inspect its contents. Adhesions should be freed. The bowel & omentum are returned to the abdominal cavity.

It may be necessary, especially with a strangulated hernia to digitally dilate the neck from with in the sac in order to return the bowel. Rarely the lacunar part of the Inguinal ligament or even part of the inguinal ligament itself must be incised to free the neck of the hernia.

In these cases, care must be taken not to damage an abnormal obturator artery.

The sac is transfixed and ligated at the neck or simply snipped off & the stump returned to the abdominal cavity.

The extraperitoneal fat excised, the margins of femoral canal cleared and are exposed for closure of the defect.

The repair is done with monofilament polypropylene or polyamide 2-o. Ideally Inguinal ligament should be sutured to the pectineal ligament (Cooper's ligament) with a few interrupted stitches. It is technically difficult.

The simplest alternative – pursestring repair. A thick bite taken through inguinal ligament, then alternatively through the lacunar ligament, the pectineal fascia, the fascia over the medial aspect of the femoral vein & finally once more through inguinal ligament & tied.

Delvin described figure of eight closure Lichtenstein described Keeping a plug rolled up strip of polypropylene mesh fitted snugly into the canal & few stitches to hold it. When dealing with strangulated hernia with gangrene, resection& anastomosis difficult so a 2nd small laparotomy incision needed for that Lotheissen approach is through the posterior wall of Inguinal canal.

Henry preperitoneal approach through a lower midline abdominal incision in incarcerated on strangulated femoral hernias.

Advantage for this approach is contralateral hernias detected.

Bendavid – described high recurrence rate for femoral hernia also a relaxing incision for femoral herniorrhaphy. So used umbrella of polypropylene mesh.

TREATMENT OF INGUINAL HERNIAS

Darn Repairs

The Abrahamson Nylon Darn Repair. A good hernia repair should last the patients for the rest of his life, no matter what his age at time of the operation. The surgeon must bear in mind this responsibility. A 1982 report showed that almost 6% of recurrences occurred during the first postoperative month, 39% during the first year after the primary repair, and 24% occurred later than 10 years after the operation. The Shouldice Hospital has reported that late recurrence is not uncommon in cases followed for 10 to 40 years. As the causes of early recurrence after hernia repair were eliminated (faulty technique, ignorance of the functional anatomy and physiology of the abdominal wall, repair with tension, the use of incorrect suture material, and infections), it became apparent that even with the finest technique and materials and the best intentions, a percentage of hernias will recur over the years because of factors beyond the control of the tissues and deterioration of body fitness with time and aging, increased adiposity, raised intra-abdominal pressure owing to chronic cough, constipation, and obstructive disease of the urinary bladder. It was realized that some form of reinforcement was needed to overcome the problems of aging scar tissue and muscles and tendons approximated by sutures, especially in direct hernia repair.

A variety of natural and foreign materials were used for this reinforcement, but with little success, until the advent of strong, smooth, resistant, and pliable monofilament nylon. The principle of the nylon darn operation for the repair of

inguinal hernia is to reinforce the weakened or torn posterior wall of the inguinal canal with a simple lattice work of monofilament nylon suture under no tension, on which is laid a buttress of fibrous tissue, without the normal tissues being torn or necrosed. The nylon sutures are anchored into strong, healthy tissues far from the area of herniation. The nylon darn solves the problem of early recurrence since the nylon lattice will hold the area intact for the first year, until the natural connective tissue collagen scar matures to its full strength, However, the muscle and scar tissue is not able to withstand the constant wear and tear of repeated stress over many years. As they fail, the nylon, which is practically indestructible in human tissues, will once more come into its own and will maintain the integrity of the repair for many years, until the end of the patient's life.

The technical details of the operation were described in 1987 and 1988. The incision and meticulous dissection and preparation of the tissues are as described previously. No special dissection of a direct sac is needed, although occasionally it is convenient to reduce a sac prolapsing through a punched-out hole in the transversalis fascia and to suture the opening. A large sliding hernia with much preperitoneal fat may occasionally be conveniently reduced and the edges of the tear in the transversalis fascia closed with a continuous suture to render the repair more manageable. The transversalis fascia is not split open. The repair is begun by suturing the medial edge of the rectus sheath and the musculoaponeurotic arch (conjoined tendon) to the posterior portion of the inguinal ligament and to the iliopubic tract with a continuous 2-0 polyamide or polypropylene suture. The suture

is begun at the medial end of the repair by catching fascia on the pubis, passing through the medial end of the inguinal ligament and the remains of the fascia transversalis and then taking a good bite through the lowest portion of the medial edge of the rectus sheath and tendon and tied. The suture continues laterally in a simple over-and-over fashion including, along the lower edge, some fibers of the inguinal ligament, the iliopubic tract, and the lower part of the transversalis fascia. Along the upper edge, the medial edge of the rectus sheath is sutured as far laterally as possible, after which the suture takes in part of the transversalis fascia as well as the lower edge of the aponeurosis of the transversus abdominis and also the aponeurotic part of the internal oblique. The fleshly part of the internal oblique is not included in the suture. Fairly large bites of tissue are taken along the upper edge. Suture bites on the inguinal ligament are staggered, some more forward and others further behind so that all the repair will not be secured to only a few fibers of the inguinal ligament. The aim is to approximate the rectus sheath and conjoined tendon to the inguinal ligament. This is easily done without tension, or under minimal tension, in most cases. When this is not possible, we do not force the approximation under tension but leave a gap, usually only a narrow one, between the upper elements of the repair and the inguinal ligament. At the lateral end, the edges of the internal ring are picked up and included in the sutures to achieve a fairly light and snug closure of the ring around the cord. This line of sutures is carried laterally beyond the internal ring for 1 to 2 cm, with the object of covering the internal ring with the musculoaponeurotic tissue of the arch, in order to

reinforce the ring against an indirect recurrence. Up to this stage, the procedure constitutes a tissue repair and its strength depends on that of the tissues used. If no more is done, some cases will develop early recurrence and others late recurrence. This repair has the advantage of closing the rent in the transversalis fascia and of tightening the internal ring and providing a thick musculoaponeurotic barrier for the posterior wall the canal. It also provides a smooth, flat bed on which to lay the darn.

The darn is done with 0 monofilament nylon thread (polyamide 6), 1.5m long and doubled to form a loop 75 cm long, with the free ends swaged onto an atraumatic curved 40 mm round-bodied needle. Starting at the medial end a bite is taken if the most medial fibers of the inguinal ligament where they sweep over the pubic tubercle. The point of the needle then is pushed under the lateral edge of the rectus muscle and sheath and is extracted. The needle is then simply passed through the tail end of the loop, and tightened, eliminating the inconvenience of a knot. The suture is continued laterally, taking bites of the inguinal ligament below and deep wide bites of the rectus muscle and its sheath to ensure a good darn in the critical medial angle of the repair where recurrences tend to occur. When the rectus sheath can no longer be used, the sutures pass onto the conjoined tendon. Each stitch is laid in a vertical fashion. The stitches on the inguinal ligament are staggered to spread the tension between the fibers. At the upper end the suture passes over the muscular lower part of the conjoined tendon. The stitches are held slightly tight-just enough to straighten the thread, and are not placed under tension. This vertical line of sutures is continued laterally, in front of, and even slightly beyond, the internal ring,

displacing the cord laterally. The same suture changes direction and returns medially as the second layer of the darn It passes in front of the covered internal ring. The stitches are now laid in a sloping fashion, passing upwards and medially from the inguinal ligament to the conjoined tendon and later the rectus sheath, crossing the stitches of the first run at an angle. The bites on the inguinal ligament also are staggered and a bit anterior to those of the first run, in order to spread the tension. Large bites are taken, as before, of the aponeurotic fibers of the conjoined tendon, and placed this time more cranially than the first low. No tension is placed on the sutures. At the medial end, a bite is taken on the inguinal ligament at the pubic tubercle and of the lower end of the rectus sheath and tied.

The third line of sutues is the same as the second except that the stitches slope cranially and laterally from the inguinal ligament . The suture is passed through the medial end of the inguinal ligament and the rectus sheath, then through the loop, and tightened. At the medical end, the suture takes up all of the inguinal ligament where it forms the lower edge of the external ring and it then passes onto the inguinal ligament and there may no longer be any room left on the inguinal ligament for a third line, which may get “pushed”forward on to the aponeurosis of the external oblique muscle (which of course is the continuation of the inguinal ligament). This gives an added advantage of wrapping the inguinal ligament and lower flap of the aponeurosis of the external oblique around the inferior edge and anterior wall of the repair. The upper end of the sutures of the third run should be

placed at a higher level than the second run. Big bites are taken of the tissues and the needle is brought out as high as possible.

When the space between this line and the inguinal ligament below is narrow, there is not enough room left above for the third run. In these cases, the emerging needle hooks up some of the external oblique aponeurosis along its line of fusion with the internal oblique aponeurosis along its line of fusion with the internal oblique. In these cases, at the completion of the repair, when the anterior wall of the canal has been closed by suturing the cut edges of the external oblique aponeurosis, the blue sutures of the polyamide can be seen as a series of parallel lines on the surface of the upper part of the external oblique aponeurosis. The third run of the darn should be continued laterally beyond the internal ring and tied. The stitches of each run should be sufficiently close to form a close darn There should not be large gaps through which a hernia could recur. Gaps should be filled while doing any of the three runs. It is of no importance if some of the stitches are placed in different directions and at different angles. Because of the slope of the sutures, the second and third runs reinforce the repair below and above the internal ring The cord is laid on the darn, and the anterior wall of the inguinal canal is reconstituted in front of the cord by suturing together the cut edges of the aponeurosis of the external oblique with a continuous suture of 2-0 monofilament nylon. Scarpa fascia and the subscutaneous fat are not sutured. The skin is closed, preferably with a continuous intradermal (subcuticular) suture of 5-0 synthetic absorbable thread, but

alternatively Michel clips may be used. Clips are removed on the second postoperative morning. less than 48 hours after the operation.

This author reported more than 1000 repairs of primary and recurrent hernia using this technique. In a follow-up maximum of 15 years, the recurrence rate for primary repairs was 80% and was 0.33% in the last 300 cases.

The nylon darn repair for inguinal hernia resembles the mass closure technique for abdominal incisions. The monofilament nylon thread must be thick enough not to cut through the tissues but no so thick as to be unpliable and difficult to handle. Large mass bites of full-thickness tissue must be taken to hold the sutures. The stitches should not be so close as to cause ischemia of the tissues between them, but no so far apart as to allow extrusion of abdominal contents. The sutures in the conjoined tendon must be carefully placed in good, healthy tissue at a distance from the stretched and attenuated muscles around the hernia. The smooth nylon can slide in the tissues and adjust the tension on individual sutures during relaxation and exercise.

Pure Prosthetic Repairs

The Lichtenstein Tension-Free Repair. In the second edition of his book on hernia repair, Lichtenstein describes a preliminary report of more than 300 cases of direct and indirect hernia treated by a new concept.16 At that stage the maximum follow-up was only 2 years, but no recurrence was noted. In 1993, Lichtenstein reported that since 1894, all primary direct and indirect hernias in adult men had been treated by the tension-free technique without closure of the defect.113 In more

than 3000 cases there were only four recurrences that occurred early in their experience. There were no failures in the last five years. The procedure is performed under local anesthesia in an outpatient facility. The skin and subcutaneous tissues are incised and the external oblique aponeurosis is slit open to reveal the inguinal canal. The cord is elevated from the posterior wall of the canal. An indirect sac is dissected free and invaginated into the abdomen. If there is a large direct hernia, the sac may be invaginated by an absorbable imbricating suture to allow positioning of the screen on a flat surface. Polypropylene suture . This creates a new internal ring and shutter mechanism. The external oblique aponeurosis then is resutured in front of the cord. This is a completely tensionless repair and requires no formal reconstruction of the canal floor; it is a revolutionary departure from the tissue repairs used for the past 100 years since Bassini.

The Stoppa Great Prosthesis for Reinforcement of the Visceral Sac. This pure prosthetic type of repair is unique and quite revolutionary in concept and requires a complete mental turn about in one’s approach to hernia surgery, which has always been concerned with, or perhaps even obsessed by, methods for the repair of the defect of the weakened, stretched, or torn abdominal wall breached by hernias. Stoppa’s method is not primarily concerned with these openings in the abdominal wall parietes and practically ignores them. The principle of the method, as described by Stoppa, is “extensive prosthetic reinforcement of the peritoneum” by a large sheet of knitted polyester fiber (Dacron, mersilene) placed between the peritoneum

and the anterior, inferior, and posterior, and lateral abdominal walls through a midline lower abdominal incision. The mesh stretches around the lower abdomen and pelvis from one side to the other like a bucket, enveloping the lower half of the parietal peritoneum with which it becomes incorporated by collagen and scar tissues. This acts as a large prosthetic buttress of the peritoneal envelope and renders it quite inextensible and no longer able to herniated through any of the actual or potential hernial orifices

When correctly placed, the large prosthesis does not require any anchoring sutures. It is kept in place by Pascal's principle of hydrostatic pressure: " The intra abdominal pressure acting via the peritoneal envelope holds the prosthesis solidly against the abdominal wall. In this way the prosthesis is immediately fixed in postion, then reinforced by the cicatricial investment of the Dacron mesh." The method does not cause any further damage to the abdominal wall in the region of the groin.

Stoppa has used this technique since 1968 and summarized his experience in 1987. This important addition to the armamentarium of the hernia surgeon will no doubt be used extensively in the future. Stoppa stresses the ease and speed with which this procedure is performed and recommends it especially in cases of complicated hernial lesions or multiple recurrence in which the inguinal anatomy has been largely scarred and distorted or destroyed. It is particularly useful in elderly patients with large bilateral hernias. Most surgeons will no doubt continue to repair inguinal hernias by the more conventional methods, as does Stoppa and his

group. However, this group has engendered such confidence in the method that they now recommend it for routine use in patients more than 60 years of age even with a unilateral hernia, and at the slightest doubt in the patients under 60 years of age, such as those with bilaterial hernias, with a weak abdominal wall, or whose work demands heavy physical labor. They summarized their indications for GPRVS as "those hernias that present a high risk of recurrence such as recurring hernias, bilateral groin hernias, groin hernias associated with low incisional hernias, simultaneous direct and indirect hernias, large hernias, recurring hernias when poupart's and/or Cooper's ligaments are destroyed, and prevascular hernias." To this list he added those hernias related to collagen diseases such as Ehlers-Dan-es and Marfan syndromes and patients in whom surgery is a risky proposition because of old age, obesity or cirrhosis. This is indeed a long list of patients who make up 30% to 40% of groin hernias in Stoppa's practice. He reports a series of 2000 cases of GPRVS followed from 1 to 12 years with recurrence rates of 0.56% for primary groin hernias and 1.1% for recurrent groin hernias – a truly remarkable success story when one considers that the "best" cases were operated on by conventional inguinal methods, whereas the "worst" cases were repaired by GPRVS.

Postoperative Recovery

Patients whose hernias have been repaired under local anesthesia usually leave the hospital on the same day. Those who have had a general, spinal, or epidural anesthetic may also be discharged on the same day but are often kept

overnight. Postoperative pain can be reduced to a minimum in those case not treated by a anesthetic, by injecting a long-acting local anesthetic such as bupivacaine into the tissues of the groin region and into the iliohypogastric and ilioinguinal nerves. Alternatively, the local anesthetic agent can be simply instilled into the wound to flood the area before closing the external oblique aponeurosis. These methods of producing postoperative analgesia are efficient.

When necessary, simple nonopiate analgesia can be given orally.

In 1925, Herzfeld, working in an overcrowded hospital in a socioeconomically depressed area, introduced ambulatory daycare hernia surgery in infants and children and showed that there was no relationship between early discharge and postoperative complications or recurrences. Once it became accepted that there is no relationship between early mobilization and the risk recurrence of the hernia, postoperative hospitalization became superfluous for most patients. There was no specific service that the institution could contribute to them at home. However, the socioeconomic and medical status of a patient may make him unsuitable for same-day discharge. This was confirmed in the Lancet in 1985 ; it was found that in practice, about one-third of patients were discharged on the day of operation, about one-third were kept in overnight and discharged less than 24 hours after the operation, and the remaining one-third was discharged only after four to five days because of age, medical and socioeconomic reasons.

In the private hernia centers in the United States, the patients are usually of a higher socioeconomic status, making for a certain amount of selection of patients. The result is that practically all of the patients are discharged on the same day of the operation. This applies to many thousands of patients from such centers as Lichtenstein's in California, Gilbert's in Florida and Rutkow's in New Jersey. Yet at the Shouldice Hospital, the patients are kept in for three days postoperatively and for three days postoperatively and for five days if bilateral repairs are done. In the United States, Bellis recently reported his personal series of 27 267 cases of inguinal herniorrhaphy done under local anesthesia and with the use of mesh, all discharged on the same day. The rest are given spinal or general anesthesia and are discharged the next morning, usually less than 24 hours postoperatively. A very few may stay on for an extra day or two because of medical or socioeconomic reasons. All patients are encouraged to ambulate on the day of the operation and to be as active as possible thereafter.

The modern tendency to close the skin with an intradermal continuous absorbable suture has simplified wound care. Good alternatives are closing the skin with adhesive bands, or Michel clips. These methods avoid having a foreign body, the suture, pass through the skin to the subcutaneous layers and thus possibly introduce infection along the suture track. All dressings are removed on the first postoperative morning. The wound should be clean and dry and sealed by this time. Patients may shower or bathe as they wish. Clips are removed on the second postoperative morning, that is, less than 48 hours after the operation.

No restrictions are placed on physical activities. Patients are encouraged to return to a normal active lifestyle as soon as possible, within the initial limitations of postoperative discomfort. The repair immediately after the operation is as strong as it will ever be if strong monofilament nylon or a synthetic nonabsorable mesh was used and was anchored into healthy tissues. The darn or the prosthetic material is indestructible from the practical point of view and will hold the repair indefinitely. The collagen scar tissue contributes no strength thereafter. There is therefore no advantage in limiting postoperative activities. This has been substantiated by a series of thousands of cases. During the past 45 years, it has been shown repeatedly that there is no evidence that lengthy rest reduces the chance of recurrence and that the opposite is usually the case. For almost 50 years, patients at the Shouldice Hospital have traditionally walked from the operating room table to their bed and yet this center has a remarkably low recurrence rate. Patients who return to work and resume heavy lifting have the same recurrence rate as those who return to nonstrenuous work. Indeed, several series have shown that persons with sedentary occupations have double the risk for recurrences as opposed to those who return to heavy manual labor. Barwell showed that the recurrence rate depends less on the activity of the patient and more on the technique used for repair and the ability of the surgeon. However, even though we allow patients to return to normal activities, that does not mean that they do so. Motivation on the part of the patient is the most important factor influencing the time of return to work. In my own practice, I find that highly motivated, self-employed professional are back in their

offices within a few days of the operation. Less motivated, salaried employees with generous sick leave and pay benefits may quickly return to their private activities but are in no hurry to return to work, especially if their family doctor easily provides sick leave certificates. In these cases, they may return to work only after three to eight weeks or more, depending on the degree of physical effort entailed in their work. This represents a great loss to the national work force and income. Although there is no fixed rule, 10 days to 2 weeks leave postoperatively is considered sufficient for a sedentary worker and 3 weeks for a manual laborer.

COMPLICATIONS OF GROIN HERNIA REPAIR

Herina repair is safe, but, like all operations, it may be attended by general or specific complications.

General Complications :

The general complications include pulmonary atelectasis, pulmonary embolism, pneumonia, thrombophlebitis, and urinary retention. Most can be avoided by good preoperative preparation and by early and active ambulation. Postoperative urinary retention should be a rare phenomenon. Prostatic patients with symptoms severe enough to need prostatectomy may conveniently have this procedure combined with simultaneous herniorrhaphy. Alternatively, the prostate should be dealt with first and the hernia repaired some weeks later. If the prostatic complaints are borderline and there is no clear indication for prostatectomy, or if the patient refuses the operation but requests repair of his hernia, the problem can be

overcome by the introduction of anesthesia. The catheter is removed 24 hours postoperatively. Urinary retention may be treated by temporary catheterization with a fine neonatal feeding tube as above, and with phenoxybenzamine (Dibenzyline). Persistent cases may need prostatectomy. The most potent cause of postoperative urinary retention is probably distention atony brought about by overfilling of the bladder owing to over-enthusiastic infusion of fluids during and after the operation,especially when general, spinal, or epidural anesthesia is used. Herniorrhaphy causes only minor surgical trauma and there is no need for large volumes of intravenous fluids. The infusion may be removed within an hour of cessation of the operation and oral fluids can be taken a few hours later.

Local Complications

Hemorrhage. Ecchymosis of the skin around the incision is common. Occasionally mild ooze of blood may seep into the skin of the penis and scrotum. The discoloration may appear alarming, but the blood absorbs and disappears within a matter of days. Scrotal hematomas may reach large proportions but usually absorb with time. Sometimes they may need to be aspirated or evacuated surgically, although this is often no possible because of the blood having oozed into the scrotal tissues. Rarely, these hematomas become infected, and the resulting abscess must be drained.

Serious hemorrhage may occur during the operation. It usually is the result of injury to the inferior epigastric vessels during suturing and is handled by ligating

these vessels. More serious is a tear in the external iliac vessels, which may necessitate formal exposure and repair of the arterial or venous wall.

Bladder Injury. The urinary bladder may be opened inadvertently when dissecting the sac of a direct or large indirect hernia. This usually can be avoided if direct sacs are not dissected but simply inverted when the posterior wall of the canal is repaired. It is also less likely to happen if indirect sacs are invaginated and not ligated high. The opening in the bladder is sutured in two layers and a urethral catheter is placed in the bladder for 8 days.

Testicular Complications. Testicular swelling, orchitis, and testicular atrophy are the result of interference with the blood supply and probably the lymphatic drainage of the testis. They are rarely the result of tearing and ligation of the testicular artery but may be the result of tying off the veins in the spermatic cord when the cremaster muscle is resected, and when the distal part of the sac has been dissected unnecessarily.

Another cause of testicular swelling or atrophy may be congestion owing to closing the internal ring too snugly around the cord. The testicular swelling may take some weeks to subside and occasionally leads to testicular atrophy. In the case of planned or accidental transaction of the cord, apparently no damage is done in about one-third of the cases, if the testis has a good collateral blood supply and the cremaster has not been excised below the level of the pubic tubercle. In the other two-thirds, some degree of testicular swelling, pain, tenderness, and fever ensue, and one-half of these cases goon to atrophy of the testis. In the others, some degree

of permanent damage to the testis ensues. Rarely, acute necrosis and gangrene of the testis occur and often are complicated further by infection and abscess formation. This is best treated by antibiotics, early reoperation, and excision of the necrotic testis and cord. The wound is left open.

In children and young adults, testicular damage will have serious consequences owing to reduced fertility. It has been reported that 6.65% or 8500 patients with infertility had had inguinal hernioplasty with or without subsequent atrophy of the testis, and semen quality was reduced markedly owing to ischemic orchitis or immunological reactions. Kald found a 2.7% rate of testicular atrophy in patients years after hernia repair, and Fong and Wantz urged minimal cord dissection, leaving intact all significant distal hernial sacs and no dissection beyond the pubic tubercle. They recommend the properitoneal approach for all recurrent hernias to avoid difficult dissection of the cord.

Vas Deferens Injuries. Transection of the vas deferens is an unusal accident. In the young adult, it is best treated by immediate anastomosis. In older men, the torn ends are simply ligated. It must be stressed that, besides obvious tearing or cutting of the vas deferens, it may also be damaged, especially in children, by undue pressure, traction, kinking, and especially by squeezing between the ends of a dissecting forceps. These traumas lead to damage to the wall and mucosa of the vas, with consequent fibrosis and obstruction. The problem of transaction or obstruction of the vas deferens is not just the failure of the sperm to reach the seminal vesicles, nor just the pressure atrophy leading to degeneration of the spermatic tubercles, but

also the production of serum antisperm antibodies. Vasilev reported eight cases of sterility following iatrogenic obstruction of the vas after repair of inguinal hernias. Reanastomosis was done in six by microsurgery with marked improvement in the spermatological indices in three. Sandhu discusses the problem of oligospermia after vas deferens injury at hernia operations. Matsuda points out that in his series, the incidence of unilateral vas deferens obstruction was 26.7% for subfertile patients with a history of inguinal hernia repair during childhood. He also states that the true incidence of vasal disruption caused by inguinal hernia operations in infancy is unknown but is probably greater than his series indicates. A significant percentage of patients with vasal obstruction caused by infant inguinal herniorrhaphy have serum antisperm antibodies despite the absence of sperm granulomas.

Bowel Injuries. Small bowel may be injured if caught in the transfixion suture when the sac is ligated. Cecum or sigmoid colon may be opened or devascularized when they form part of the wall of a sliding hernia. These complications are avoided if the sac is invaginated and not suture ligated. They are serious injuries and require experience and judgment for correct and successful management.

Nerve Injury. The nerves in the region often are injured during inguinal hernia operations. The main nerves are the iliohypogastric, ilioinguinal, and the genital branch of the genitofemoral. In theory,they should be preserved but, in practice, this is not always possible. The iliohypogastric nerve is often transected when the upper leaf of the external oblique aponeurosis is elevated. The ilioinguinal

nerve may be torn when the cord is mobilized, and the genital branch of the genitofemoral nerve is usually resected when the cremaster muscle is excised. These injuries cause varying degrees of anesthesia or paresthesia in the region of the sensory distribution of the nerves, which pass after some weeks or months. Fortunately, extensive crossing and overlapping between these nerves limit the area of discomfort. Sometimes nerves are caught in sutures and cause severe buring pain on movement. This too usually passes spontaneously but occasionally may require injection for nerve blocking or even exploration for release of the entrapped nerve.Rarely, the femoral nerve may be caught in a suture during a Cooper's ligament repair or a large prosthetic repair, causing paresis or paralysis of the muscles supplied by the nerve and requiring exploration and release of the entrapped nerve. These so called postherniorrhaphy neuralgias often are compounded by personality and behavior problems as well as by hopes of financial compensation.

Wound Infection, Wound infection is a potent cause of recurrence of hernias. In specialized ambulatory surgery units the incidence of postoperative wound infections is around 1% or less. In general hospitals, the incidence may be as high as 5%.Furthermore, these figures may not reflect the true incidence of wound infection since they are published by the surgical units who do the operations, and several recent surveys show that 50% to 75% of the true incidence of hernia wound infections occur after the patients have left the hospital and are unknown to the

surgeon so that the overall incidence may be even four or five times that usually reported.

Wound Infection. varies in degree from the mildest and insignificant to the castatrophic. there may be only some minor redness of the skin edges, a discharge of some clear serous fluid or a small abscess. These do not influence the recurrence rate and do not need any specific treatment. More serious is frank cellulitis in and around the wound that may progress to fascitis and necrosis of the tissues on each side and in the depths of the incision, or to abscess formation and purulent discharge from the wound.Careful preoperative skin preparation, strict sterility discipline, atraumatic dissection, and gentle tissue handling will reduce wound infection to an absolute minimum. Antibiotic therapy should be initiated as soon as cellulitis is observed. This treatment may be sufficient to abort the problem. Once wound infection is established, the wound should be widely opened to allow free drainage. If monofilament nylon sutures were used the wound will heal even if the sutures are exposed, and the hernia usually will not recur. Even where a prosthetic mesh was inserted, the wound usually heals. The mesh need rarely be removed. Postoperative suction drainage significantly reduces the incidence of wound hematoma, seroma, and infection following repair of large hernias, recurrent hernias, difficult hernias requiring much dissection, and otherwise complicated hernias.

There is no general consensus about the use of prophylactic antibiotics in hernia surgery. A routine inguinal hernia repair should not need antibiotic coverage.

Ronaboldo, in 1993, reports that 72% of wound infections occur after discharge from hospital and incur high costs to the patient and the medical services. Thus, prophylactic antibiotics should be considered for clean cases of hernia since they are easy to use and cost-effective if given orally. There is no clear evidence to show that the postoperative infection rate is lower when antibiotics are used. Detailed attention to gentle operating techniques is probably more important. An antibiotic "umbrella" cannot cover up for bad surgery. Some surgeons irrigate the operation site at intervals with an antibiotic or bacteriocidal solution, but there is no evidence to show that this influences the rate of infection.

When dealing with very large hernias, or recurrent hernias or hernias with infected granulomas from previous operations, or with incisional hernias, antibiotic coverage is commonly used because bacteria may remain present in wounds for prolonged periods of time. A wound once considered infected should always be considered so.[218] It has been recommended that perioperative antibiotics should be used when reoperating a recurrent hernia. Houch found that repair of incisional hernia has a significantly higher infection rate than other clean operations, ten times that for clean laparotomies and 20 times that for inguinal herniorrhaphy, and especially so if the original incision was infected. The high rate of infection is significantly reduced if perioperative antibiotics are used. Repair of an incisional hernia or a recurrent hernia should not be classified as a clean surgical procedure but should be regarded as a contaminated operation requiring perioperative antibiotics.

Postherniorrhaphy Paravesical Suture Granulomas.

Several publications have recently reported the finding of a palpable mass close to the urinary bladder, caused by a foreign body reaction to sutures used in the repair of an inguinal or femoral hernia. The mass may be found some months after the hernia operation or even up to 11 years as in one reported case. Lynch reported 11 cases. Some of the cases had urinary symptoms, probably not linked to the presence of the mass that was found abutting on the bladder. In these cases, a malignant tumor was suspected clinically. Neulander reported a case of a patient with carcinoma of the urinary bladder where the palpable mass was thought to be a pelvicmetastasis. The treatment for postherniorrhaphy paravesical granuloma is excision.

RECURRENT HERNIA

Etiology

The success of a hernia operation depends almost entirely on the skill, knowledge, understanding, and experience of the surgeon. The best results are achieved in specialized units by dedicated surgeons who confine their practice to hernia surgery. The need for specialized units has recently been discussed. It follows, therefore, that most failed herniorrhaphies, especially the early recurrences, are the result of failure on the part of the surgeon. Late recurrences are usually owing to tissue failure, but here, too, the surgeon is partly to blame in that he failed to take the necessary preventive measures at the original operation. The causes of failure have been discussed earlier in this chapter and are dealt with in greater detail in a 1994 reported by Abrahamson. Recurrent hernias are more often direct than indirect, indicating that when repairing an indirect hernia, surgeons do not pay enough attention to the state of the posterior wall of the canal and fail to reinforce it to prevent later failure in the form of a direct hernia.

Tension is a cardinal if not the most important one, in the failure of a hernia repair, and has been discussed earlier in the chapter. Tissues sutured under tension will tend to pull apart but are prevented from doing so by the sutures. However, the tissues pulling on the sutures create an area of ischemic pressure necrosis where the suture meets the tissue. This process of ischemic pressure necrosis will progress until there is no longer any tension, which usually occurs when the tissues have returned to their previous unsutured position and the hernia will recur through the

resultant gap. A second mechanism is the cutting out of the sutures from the tissues when the suture tension becomes greater than the strength or holding capacity of the tissues. This depends on several factors but in normal, healthy tissues, it mainly depends on the distance of the suture passing through the tissues from the cut edge and the angle that the suture makes with the line of the fibers of the tissue enclosed in the suture, the more the suture is at right angles to the fibers, and the more aponeurotic the tissue, the less likely is the suture to cut out. The highly successful newer techniques of hernia repair – the tensionless repair of Lichtenstein, the sutureless technique of Gilbert, and the mesh-plug hernioplasty of Rutkow-are all based on the absolute absence of tension.

Infection also will lead to the breakdown of hernia repairs. It has been estimated that approximately 50% of recurrent hernias are the result of infection. Recurrences four times greater in infected than noninfected repairs in the Shouldice Hospital series. Berliner reported that four out of ten infected wounds in his series developed recurrences. These figures are typical for most published series. The mechanisms by which infected wounds break down are not entirely clear. When there is a frank cellulitis and tissue necrosis, it is obvious why there is complete breakdown of the repair. In less severe reactions, where absorbable or nonabsorbable biological sutures such as silk have been used, the breakdown products of the inflammatory process may hasten the disintegration of the sutures before the wound is strong enough to hold together on its own, so that the wound, unsupported by the sutures, will fall apart.

The inflammation and edema lead to softening and weakening of the tissues, rendering them unable to hold the suture against the strains to which the wound is subjected, so that the tissues will tear and allow the suture to cut out. The infection, with the ensuing inflammation and edema, will cause the tissues to swell, but the mass of tissue enclosed in each suture will attempt to swell against the unyielding ring of the thread, causing pressure necrosis of these tissues and loosening of the suture.

At this stage, even though the wound may heal and the sinuses close, the sutures no longer give the vital support to the tissues. The repair will heal with scar tissue that will eventually give way under the stresses and strains to which it is subjected and the hernia will recur.

The suture material must be nonabsorbable and monofilament, either stainless steel wire or synthetic sutures of the nylon type. There is no logical reason for the use of absorbable sutures nor of biological sutures. Twisted or braided multifilament sutures also should be avoided. The incidence of recurrence is higher with these sutures. A smooth monofilament nylon, a continuous suture with big bites of tissue spreads the tension evenly throughout the suture line and has more “give” under stress.

The size of the hernia has a negative influence on the outcome of a hernia repair. The larger the hernia, the greater the incidence of recurrence. The tissues have been stretched and attenuated by longstanding pressure, and the large defect is more difficult to close by any method. Previous operative trauma, as reflected by

the number of recurrences and repairs the hernia undergone, will increase the chances of a further recurrence.

An emergency operation on a strangulated hernia in an infant or a child increases the recurrence rate. The tissues are swollen, edematous, and soft and the detailed anatomy is blurred, leading to intraoperative trauma such as overstretching o the internal ring, tearing of the musculoaponeurotic arch of the conjoined tendon, tearing of the posterior wall of the canal, and to later recurrence of the hernia. In the adult, however, there is no clear evidence that an emergency operation at the time of strangulation increases the recurrence rate. Inadequate dissection of the sac of an indirect hernia will leave a preformed passage for a recurrent hernia.

A missed or overlooked hernia may occasionally be the cause of a recurrent hernia. When an obvious direct hernia is found at operation, failure to explore the cord for the presence of an indirect hernia as well, or at least to the development of an indirect recurrence. Other often overlooked causes are one or more small herniations of extraperitoneal fat through the transversalis fascia or even higher up through the internal oblique and transverses abdominis muscles. Attempts should be made to reduce them and to suture each opening; the posterior wall of the canal and the conjoined musculoaponeurotic arch then should be reinforced with a nylon darn or prosthetic patch.

It is commonly but incorrectly held that orchidectomy will enhance the chances for a better repair and avoid recurrence of a hernia; there is no evidence for this. An undescended testis associated with a hernia in the adult should be removed.

The testes also may be removed when repairing hernias in males with carcinoma of the prostate. Rarely, the cord may be torn when repairing a multiple recurrent hernia, and the testis left with very few attachments to provide collateral circulation. In this situation, it is best removed.

The type of operation done for the repair of an inguinal hernia does not influence the recurrence rate. All the recognized techniques have a more or less 1% recurrence rate or even less when done by an experienced hernia surgeon who is familiar with the method and applies it to a suitable patient. On the other hand, even the best method can be botched by an inexperienced and/or ignorant surgeon.

The general conditions that may lead to recurrence of a repaired hernia are listed and discussed in the section on postoperative ventral abdominal hernias and are also dealt with in greater detail in a report by this author. Contrary to the commonly held belief, obesity has not been shown to be a factor in the occurrence or recurrence of inguinal hernia. In fact, it has been found that obesity even has a certain protective influence in inguinal hernia development. Others have found that a larger proportion of patients with recurrent inguinal hernia were near or below ideal body weight. It seems, however, from most reports, that the percentage of ideal body weight of a patient has no apparent effect on the recurrence rate. The situation is quite the opposite when dealing with postoperative ventral abdominal(incisional) hernias where overweight plays a major role in the production of and in the failure of the operative repair of the hernia.

In 1981, cannon reported on the profound influence that tobacco smoking has on the production of inguinal hernia and recurrence after repair. The concept has been developed further by others and, in 1991. read summarized the subject and quoted numerous references. It appears that circulating proteases are released by the lungs leading to free, active, and unbound neutrophil elastase in the plasma of cigarette smokers and that the systemic protease-antiprolease imbalance is a response to cigarette smoking. The uninhibited proteolysis leads to emphysema, hernia, abdominal aortic aneurysm, and skin degeneration.

Inguinal hernia often develops in patients with ascites and there is a high recurrence rate after repair of the hernias in these patients. The mechanism appears to be the opening of a patent processus vaginalis by the increased intra-abdominal hydrostatic pressure. The same effect applies in children and adults with ascites from other causes as well as those with ventriculoperitoneal shunts for hydrocephalus, and those on peritoneal dialysis, especially children on continuous ambulatory peritoneal dialysis(CAPD). In children there is a high incidence of recurrence of the inguinal hernia if only high ligation of the sac(herniotomy) id done. Children should be carefully evaluated for hernia when they become candidates for peritoneal dialysis and hernias should be promptly repaired as an elective inpatient procedure, with a formal herniorrhaphy performed. In males under two years of age, a bilateral repair should be done even if only a single hernia is present. Once a peritoneal dialysis catheter has been placed, radionuclide substances can be introduced with the dialysis fluid and actual or potential hernias can be

demonstrated on groin scans. Inguinal herniorrhaphy can be performed safely on patients on peritoneal dialysis, with the dialysis restarted immediately after the opration. IN patients with liver cirrhosis and refractory ascites, there is a high recurrence rate or repaired hernias, and the treatment of the ascites is a major determinant of the success of the hernia repair. If the ascites cannot be controlled by medical means, then a peritoneovenous shunt should be inserted separately or concomitantly with the herniorrhaphy. Patients with ascites owing to intra-abdominal malignant disease also tend to develop hernia. This may be the first manifestation of their disease.

Multiple recurarences of repeated repairs of a hernia may, in some cases, be the result of disorders of collagen production, maintenance, and absorption. In 1987, Peacock recommended a procedure to repair a recurrent direct inguinal hernia based on the hypothesis that recurrence is the result of a localized disorder of collagen metabolism. Stimulation of net collagen synthesis and deposition to restore the balance between collagen synthesis and collagenolysis is achieved by the inductor qualities found in normal human perifascial tissue. The hernial defect is corrected by grafting tissues rich in inductor substances.

Incidence :

The incidence of recurrent hernia after primary repair varies widely, from less than 1% in special interest centers to 30% in general surveys. The longer and more complete the follow-up the higher the recurrence rate. Recurrence after more than one repair is higher and increases with the number of repairs. In a series of 350

recurrent hernia repairs by nylon darn that this author reported in 1988 and had followed up for 2 to 15 years, the recurrence rate was 28 percent.

Operations for Repair of Recurrent Hernia

The findings at operation will very between two extremes. On one hand there are fairly well preserved tissues and on the other extreme and especially after multiple repairs, the tissues are largely destroyed, distorted, and scarred. The usual structures used to anchor repairs such as the inguinal and pectineal ligaments have also disappeared. The hernia bulges through a large defect between the thigh and the abdominal wall. These have been called inguino-femoral hernias or hernias through Fruchaud's space or the myopectineal orifice.

When small defects are present and the repair is otherwise satisfactory, especially in the elderly, a limited repair of only the defect need be done after the sac has been freed and invaginated. The edges of the defect may be approximated by a continuous monofilament nylon suture and reinforced by a small onlay darn of the same suture. In 1986 Lichtenstein reported his new concept for a simplified tension-free repair for this type of recurrence. After the sac has been dealt with, a plug fashioned from a rolled-up 2*20 cm strip of polypropylene mesh is inserted to fill the hole and is sutured to the edges.

In the majority of cases of indirect or direct recurrence, what is left of the previous repair must be taken apart and the normal anatomy restored by meticulous dissection of the anatomic layers. Every bit of usable tissue must be preserved.

After suitable preparation, there is usually sufficient tissue of good strength to allow for performance of one of the standard hernia repairs. It is sometimes useful to place a vacuum drain in the wound of repaired recurrent hernias. This reduces the incidence of hematoma and infection.

Surgeons at the Shouldice Hospital use their multilayered operation also for recurrent hernia. They have been running a trial of prosthetic mesh repair for this type of recurrence. They found that mesh was needed in recurrent indirect inguinal hernia, in 4.7% of cases. Similarly, Berliner reported that, in his series, biomaterial was required to effect a tension-free repair in only four of 350 recurrent inguinal hernias. On the other hand, surgeons such as Gilbert, Lichtenstein, and Rutkow believe that all recurrences should be repaired with prosthetic mesh by one of their standard tensionless procedures. Lichtenstein reported a series of 1500 recurrent inguinal hernias treated by his rension-free method and followed up for 3 to 20 years with only a 1.6% recurrence rate. In the past 5 years there have been only two failures in 390 cases, a recurrence rate of less than 1 %.

When much tissue has been destroyed by one or more previous attempts at repair, it is usually not possible to approximate the edges of the defect without tension, and there is no alternative to the use of a prosthetic mesh. It may be applied by the Lichtenstein onlay graft or the Rutkow mesh-plug hernioplasty technique, but larger defects are best repaired by the Rives method of placing a large prosthetic mesh between the peritoneum and abdominal wall by the inguinal approach or the abdominal extra peritoneal approach.

These methods have been elegantly described and illustrated by Wantz.

Stoppa strongly advises using his great prosthesis for reinforcement of the visceral sac (GPRVS) for large multiple recurrent hernia and especially bilateral cases.[95] This avoids the difficult and tedious dissection of scarred and distorted tissues demanded by the inguinal approach and the efforts to approximate the edges of firm and fixed defects of the abdominal wall. All these difficulties are simply ignored by the abdominal lower midline extraperitoneal approach and by wrapping the peritoneum of the lower abdomen in the envelope of prosthetic nylon mesh.

When a recurrent hernia is repaired by the inguinal approach, the spermatic cord must be meticulously dissected free from the scar tissue around it, and the testis usually can be preserved. However, orchidectomy should be considered when the cord has been damaged or in a complicated recurrent hernia. Signed informed consent should be obtained before the operation in cases in which this likelihood may arise. An advantage of the Stoppa GRPVS is that there is no need to dissect the cord or to endanger the testis.

STRANGULATED HERNIA

Strangulation is the most serious complication of hernia. As previously mentioned, the incidence is higher in the first few months of life and the younger the patient, the greater the tendency to irreducibility. Approximately 90% of strangulated hernias in infants can be manually reduced, but complications can still develop after reduction so it is best to admit these babies after reduction for observation and to operate on the hernia two days later.

In adults, Gallegos estimated the cumulative probability of strangulation for inguinal hernia as 2.8% after three months, rising to 4.5% at the end of 2 years. Thus, the greatest rate is in the first 3 months after appearance of the hernia. Thus patients with a short history of inguinal hernia should be operated earlier than those with longer histories who have been on the waiting list for some time. Strangulation occurs more frequently with incarcerated hernias, with advanced age, and in large hernias with relatively small openings. The initiating cause of strangulation is not clear. Whatever the cause, for some reason the bowel becomes relatively too wide for the opening through which it passes, leading to compression of the mesenteric veins. The increased venous pressure causes edema of the bowel wall and further compression and obstruction of the veins, going on to venous infarction and gangrene of the loops of bowel and omentum in the hernia. This process takes only a few hours, making strangulation an urgent situation. The local findings are extreme pain and tenderness, swelling of the hernia, edema, redness of the skin and irreducibility. The systemtic manifestations are those of bowel obstruction and gangrenous bowel, leading to serious fluid and electrolyte imbalance.

The mortality rate is related directly to the length of time of strangulation and the age of the patient. Manual reduction of the hernia should be attempted, with the patient sedated, if necessary. In the majority of cases, manual reduction is successful and allows a delay of a few days while the edema and systematic symptoms return to normal. The hernia then can be operated on electively. This delay is important since hernias operated on when strangulated are associated with higher mortality,

morbidity, infection, and recurrence rates, especially in elderly patients. A fair amount of sustained pressure may be used in the attempt at reduction. When strangulation is advanced or if gangrene has set in, it is practically impossible to reduce the hernia. Reduction en masse, in which the hernia sac itself, together with its strangulated contents, is pushed through the hernial defect in the abdominal wall and comes to lie in the extraperitoneal space where the process of strangulation continue, is a rare complication of strenuous attempts at reduction. In this case, relief of symptoms is not immediate, as occurs with successful reduction, and urgent operation is indicated. Irreducibility also indicates the need for urgent operation to relieve a strangulated hernia. The systemic effects of strangulation, as well as other incidental conditions such as diabetes mellitus, arrhythmias, and cardiac failure, are treated as intensively as possible in the short time available while the operating room is prepared. Operation must not be delayed for prolonged preoperative assessment or treatment. A nasogastric tube is passed, and an indwelling catheter is placed in the bladder. Perioperative antibiotics are given.

The operation is usually done with the patient under general anesthesia, although spinal or epidural anesthesia is also suitable. Local anesthesia usually is not used for a strangulated hernia. The usual standard transverse incision is made, and the subcutaneous fat is dissected off the hernial sac. The sac is opened and the contents examined before the inguinal canal is opened or the tissues are dissected. It is vital to know the state of the bowel and omentum in the sac before they are allowed to escape into the abdominal cavity. Loops of bowel proximal and distal to

the obstruction are extracted and examined, especially the bands of pressure at the hernial neck. If the bowels are satisfactory in color and peristalsis, they are returned to the abdomen, and repair of the hernia proceeds as usual. If necessary, the neck of the hernia may be dilated with a finger to extract or return the bowel. Rarely, the tight neck may need to be incised over a grooved probe. If the color of the bowel is questionable, it is worth covering it with a warm moist pad for some 10 minutes. If the normal pink color and peristalsis return and the paraintestinal vessels can be seen or felt to pulsate, the bowel is returned to the abdominal cavity.

Omentum in a questionable state is simply resected. If the bowel is frankly gangrenous or there are questionable areas that do not recover, resection an end-to-end anastomosis should be done. If the hernial opening is sufficiently wide and the bowel mesenteries long enough, they can be done via the hernia, but if the bowel cannot be sufficiently exteriorized, it is far safer to make an abdominal incision higher up and do the resection comfortably and safely. A good approach is to do a lower transverse transrectus incision on the right side. It is quite adequate for a small bowel resection. However, if large bowel is gangrenous, a midline incision is preferable for adequate exposure.

In strangulated hernias, especially if bowel resection is done, the incidence of wound infection rises, so prosthetic implants are best avoided when the hernia is repaired. The wound should be drained for 24 hours by vacuum through a nylon catheter to avoid collections of fluids, hematoma, and wound infection.

Complications of Groin Hernia Repair :

1. Recurrence
2. Chronic groin pain
   - Nociceptive - Somatic
     - Visceral
   - Neuropathic - Ilio hypogastric
     - Ilio inguinal
     - Genito femoral
     - Lateral cutaneous
     - Femoral
3. Cord & testicular
   - Hematoma
   - Ischemic of chitis
   - Testicular atrophy
   - Dysejaculation
   - Division of vas deterens
   - Hydrococle
   - Testicular descent
4. Bladder Injury
5. Wound infection
6. Seroma
7. Hematoma
   - Wound
   - Scrotal
   - Retroperitoneal
8. Osteitis - pubis
9. Prosthetic complications - Contraction
   - Erosion
   - Infection

				Rejection
				Fracture
Laparoscopic	-	Vascular injury	-	Intra abdominal
				Retro peritoneal
				Abdominal walls
				Gas embolism
		Visceral injuries		
		Bowel and bladder injuries		
Trocar site complications		-	Hematoma	
			Hernia	
		Wound Infection		
			Keloid	
Band obstruction		-	Trocar (Or)	
			Peritoneal closure site hernia	
Miscellanous		-	Diaphargmatic dysfunction	
			Hypercapnea	

General :

1. Urinary
2. Paralytic ileus
3. Nausea, vomiting
4. Aspiration pneumonia
5. CVS, RS insults

MATERIALS AND METHODS

A study of 100 cases of Groin Hernia repair has been carried out under the guidance of Professor Dr. S. Vijayalakshmi. M.S. my chief, II surgical Unit, Government Rajaji Hospital, Madurai.

The materials for this study were 100 patients who were admitted at II surgical unit, Government Rajaji Hospital, Madurai from 2004 to 2006 (period of 2 years)

A detailed history has been taken and thorough general examination was made and cases were studied as per the proforma attached.

Routine Laboratory investigations of Urine, blood, chest screening, ECG were done, certain aspects like Hypertension, obesity, diabetes, anemia, chronic bronchitis, chronic constipation were particularly noted for clinical observation, statistical analysis, follow up & results of mesh repair were noted. The data compared with that available in literature.

The following proforma has been used for the study purpose.

PROFORMA

In 100 cases of Groin Hernias taken from second surgical unit, Government Rajaji Hospital, Madurai during the period 2005 & 2006 the cases were analysed according to Age, Sex, Occupation, clinical presentation, site of previous scar, associated diseases. Detailed clinical study was done giving much importance to the following.

Name Age I.P. No.

Residence Sex

Occupation

Complaints :

1. Swelling
   a) Duration
   b) Mode of onset
   c) progression
   d) Other swelling in body
2. Pain
   a) Duration site
   b) Onset
   c) Associated features
      Abdominal pain,
      Vomiting
      Abdominal distention
3. History of strain
   a) Chronic cough
   b) Urinary complaints / difficulty in passing urine
   c) Chronic constipation

Any other relevant complaints

4. Past History :

1. Trauma to anterior abdominal wall Bull gore / stab injury
2. H/o previous surgeries
    1. No.of operations
    2. Details emergency / elective
    3. Infection of wound
    4. Post operative abdominal distention
    5. Post operative vomiting / cough / Hiccough
    6. Any other causes
3. Diabetes / Hypertension
4. Mal Nutrition
5. I & D - abdominal wall for anterior abdominal wall abscess.

Personal H/o

a) Diet
b) Smoking
c) Alcohol
d) Menstural H/o (in females)

Family H/o No. of children (for women)

Physical Examination : Appearance (Obese / malnourished / moderately built)

Tongue
Jaundice
Temp / Respiration
Pulse Rate
Blood pressure
Lymphnodes
Pedel edema

Local Examination :

A – Inspection :

Swelling :

Site, extent, size, shape

Visible peristalsis

Skin over the swelling

Signs of inflammation

Scar of previous operation

Cough Impulse

Reducibility

Presence of swelling on putting the muscle into contraction.

B - Palpation

Warmth

Tender Defect in anterior abdominal wall

Site, Extent

Consistence

Reducibility

Expansible cough Impulse

Ziemanns technique

Deep ring occlusion

Finger invagination test

Percussion - Swelling resonant or not

Auscultation- BS + or not

Any other findings

Systematic Examination :

Examination of Respiratory system

Examination of abdomen

Examination of skull, spine

PR PV (females)

Investigations :

Hb %

Urea

Blood Sugar ECG Chest all leads CXR / Serum Creatinine screening chest

Urine Sugar
Albumin
Deposits

Treatment :

1. Medical if any (for BPH medical, surgical diabetes / HT bronchitis / connective tissue disorders
2. Operation Premedication
   Anaesthesia
   Operative notes
   Post operative treatment

Discharge notes Date
Condition of patient

Advise Given Diet
Treatment to be carried out
Nature of operation
Change of occupation if any.

Follow up
a) General condition
b) Bowel habits
c) Abdominal pain
d) Cough
e) Recurrence of hernia
f) Any complication.

Comments

OBSERVATIONS & ANALYSIS

Table – 1

Age Distribution in Groin Hernias

S.NO	Age Distribution	% of Inguinal Hernia
1.	13-19 yrs	6
2.	20-29 yrs	20
3.	30-39 yrs	18
4.	40-49 yrs	16
5.	50-59 yrs	24
6.	60-69 yrs	10
7.	> 70 yrs	5

Table – 2

Type of Groin Hernia and its Occurrence

S.NO	Type	No. of patients
1.	Inguinal	99
2.	Femoral	1

Table - 3

Associated Conditions Distribution in Groin Hernia

S.NO	Conditions	Percentage
1.	Grade I BPH	30
2.	Chronic bronchitis	26
3.	Obesity	22
4.	Hydrocoele	3
5.	Undescended testis	2

Table - 4

Type of Hernia Repair

S.NO	Types	Percentage
1.	Hernioraphy	66
2.	Hernioplasty	30
3.	Pre peritoneal mesh	1

Table - 5

Side Distribution in Groin Hernia

S.NO	Sides	Percentage
1.	Right	64
2.	Left	25
3.	Bilateral	11

CONCLUSION

- The study reveals that predominantly males are affected by Groin hernias than females.
- The commonest age distribution in groin hernias is between 50-59 years
- Most of the patients are strenuous labourers.
- The Etiopathogenesis of Groin hernias are multifactorial
- Among Groin hernias, Indirect Inguinal hernia is the commonest type in both males & females and the incidence of right sided hernia is more.
- The percentage of associated conditions with groin hernias are

a) Hydrococle 3%, b) Undescended testis 2%

c) Grade I BPH - 30%d) Chronic Bronchitis - 26%

e) Obesity - 22%

The occurrence of complication in groin Hernias

a) Irreducibility - 4% b) Obstructed hernia 1%

c) Strangulation 1%

And now these complications have reduced due to early diagnosis, earlier referral and earlier treatment

The modality of management applied in this study is

a) Herniarrhaphy in young adults with good muscular tone

b) Hernioplasty in patients with poor muscular tone

c) Darning type of tissue repair done in 26 cases have no post operative complications

7% of recurrent hernias have been operated in this study

Preperitoneal mesh repair now practised is having very good results

Recurrence rate in my study is 3%

Two cases following herniorrhaphy

One case following mesh repair.

The recurrence and other post operative complications in Groin hernias can be prevented

a) By diagnosing and treating the etiology & the predisposing factors causing groin hernias
b) Taking care of nutritional status of the patient
c) Proper technique in the management
d) Wound care
e) Follow up and advice
f) Tension free and mesh based repairs have the lowest rates of re-operation
g) Most recurrent hernias will required use of prosthetic mesh for successful repair.

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ASSOCIATED CONDITIONS